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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,589	12/31/2003	Hong Jiang	ITL1710US (P18028)	8821
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EXAMINER WALERIC CHARLES				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/750,589

Applicant(s)

JIANG ET AL.

Examiner

ERIC C. WAI

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-34 are presented for examination.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-5, 12-13, 19-22, 26-27, and 33-34 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of copending Application No. 10/750,583. Although the conflicting claims are not identical, they are not patentably distinct from each other.
4. For example, claim 1 of copending Application No. 10/750,583 recites placing a thread in an inactive state in response to a predetermined condition and sending a message from a semaphore to change the state of the thread. Claim 1 of the present

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application performs the substantially the same steps. Claim 1 of the present application differs only in that the threads are intended to be used to process graphical elements of an image. However, it would have been obvious to one of ordinary skill in the art to include processing a graphical image. One would be motivated by the desire to extend the scope of the claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwok et al. (US Pat No. 5,951,672 hereinafter Kwok), in view of Wenniger (US Pat No. 6,018,785).
7. Kwok was disclosed on IDS dated 04/20/2006.

8. Regarding claim 1, Kwok teaches a method comprising:

executing a first thread of instructions to process a first graphical element of an image to be displayed; executing a second thread of instructions to process a second

graphical element of the image to be displayed (Fig 5, wherein a main thread handles graphics work A and a child thread handles graphic works B);

placing the first thread of instructions in an inactive state in response to detection of at least one of a set of predetermined conditions related to a relationship between the first graphical element and the second graphical element (col 4 lines 35-44, wherein the first thread is in a waiting state after testing variables linking the two threads);

maintaining the first thread of instructions in the inactive state according to a semaphore entity (col 4 lines 35-44, wherein the thread remains in a waiting state when the variables indicate that the task is not complete); and

resuming execution of the first thread of instructions in response to the semaphore entity (col 4 lines 35-44, wherein the task is executed).

9. Kwok does not explicitly teach that a message is received from the semaphore entity. However, Wenniger teaches using an active semaphore to generate an interrupt signal whenever a semaphore status changes (col 6 lines 1-22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kwok to use an 'active' semaphore. One would be motivated by the desire to reduce unnecessary resource usage caused by continuous polling of passive semaphores as indicated by Wenniger (col 6 lines 10-12).

10. Regarding claim 2, Kwok teaches that the set of predetermined conditions comprises an unresolved dependency (col 3 line 64 to col 4 line 11, wherein there is an unresolved dependence on the work buffer).

11. Regarding claim 3, Wenniger teaches that the set of predetermined conditions comprises the lack of a response from the semaphore indicating that a resource corresponding to the semaphore is unavailable (col 6 lines 12-16, wherein process B must wait for receipt of the interrupt).

12. Regarding claim 4, Kwok teaches maintaining an indication of a state for the first thread of instructions and for the second thread of instructions (col 4 lines 1-11, wherein state variables for each thread are consulted).

13. Regarding claim 5, Kwok teaches that the indication of the state of each thread comprises a state variable corresponding to a dependency, if any, of an associated thread (col 4 lines 1-11, wherein state variables for each thread are consulted).

14. Regarding claim 6, Kwok does not explicitly teach that the first thread comprises a first set of ray tracing instructions and the first graphical element comprises a first ray segment, and further wherein the second thread comprises a second set of ray tracing instructions and the second graphical element comprises a second ray segment.

15. However, Kwok teaches that lighting and illumination are a crucial part of graphics processing (col 7 lines 31-48). It would have been obvious to one of ordinary skill at the time of the invention that the first thread comprises a first set of ray tracing instructions and the first graphical element comprises a first ray segment, and the

second thread comprises a second set of ray tracing instructions and the second graphical element comprises a second ray segment since processing such graphical elements are commonly done by processors processing graphics..

16. Regarding claim 7-8, Kwok and Wenniger do not teach that the first thread comprises a first set of video decoding instructions and the first graphical element comprises a first picture segment comprising a first macroblock, and further wherein the second thread comprises a second set of video decoding instructions and the second graphical element comprises a second picture segment comprising a second macroblock.

17. It would have been obvious to one of ordinary skill in the art at the time of the invention to include that the first and second thread process a set of video decoding instructions and graphical elements comprising macroblocks. One would be motivated by the desire to extend the scope of Kwok and Wenniger to video decoding.

18. Regarding claim 9, Kwok does not explicitly teach that the first thread comprises a first set of three-dimensional rendering instructions and the first graphical element comprises a first render primitive, and further wherein the second thread comprises a second set of three-dimensional rendering instructions and the second graphical element comprises a second render primitive.

19. Kwok does teach that the processor must process three-dimensional primitives (col 5 lines 12-19). It would have been obvious to one of ordinary skill at the time of the

invention that the first thread comprises a first set of three-dimensional rendering instructions and the first graphical element comprises a first render primitive, and further wherein the second thread comprises a second set of three-dimensional rendering instructions and the second graphical element comprises a second render primitive since processing such graphical elements are commonly done by processors processing graphics.

20. Regarding claim 10, Kwok does not explicitly teach that the first render primitive comprises one of a first point, a first line, a first triangle, and a first triangle strip, and further wherein the second render primitive comprises one of a second point, a second line, a second triangle, and a second triangle strip.

21. Kwok does teach that primitives are triangles defined by three vertices (col 5 lines 21-21). It would have been obvious to one of ordinary skill at the time of the invention that primitives comprise one of a point, a line, a triangle, and a triangle strip.

22. Regarding claim 11, Kwok does not explicitly teach the steps of
determining a distance value for the first render primitive;
determining a distance value for the second render primitive;
comparing the distance value for the first render primitive and the second render primitive to determine a relationship between the first render primitive and the second render primitive; and

displaying a selected one of the first render primitive and the second render primitive based on the relationship between the first render primitive and the second render primitive.

23. However, Kwok does teach that transformation and clipping operations must be performed on the graphics data using a coordinate system (col 6 lines 53-67). It would have been obvious to one of ordinary skill at the time of the invention to perform transformation and clipping operations since they are part of the graphics pipeline.

24. Regarding claims 12-18, they are the apparatus claims of claims 1, and 6-10 above. Therefore, they are rejected for the same reasons as claims 1, and 6-10 above.

25. Regarding claim 19, Kwok teaches further comprising a memory coupled with the execution circuitry to store the first thread of instructions and the second thread of instructions (wherein it is inherent that memory is used to store the instructions).

26. Regarding claim 20, Kwok and Wenniger do not explicitly teach further comprising: at least one additional execution circuit to execute threads of instructions; and a thread dispatcher coupled with the execution circuitry and at least one additional execution circuit to dispatch threads for execution.

27. It would have been obvious to one of ordinary skill in the art, at the time of the invention to add one additional execution circuit to execute threads of instructions and a

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thread dispatcher. It is well known in the art to add additional execution units to increase processing capability of processors.

28. Regarding claim 21, Wenniger teaches that when the first thread of instructions is in the inactive state, execution of the instructions ceases and the execution circuitry does not poll the semaphore entity to determine a status of the semaphore request message (col 5 lines 12-16, wherein Process B awaits receipts of an interrupt from the semaphore).

29. Regarding claims 22-25, they are the apparatus claims of claims 1, and 6-9 above. Therefore, they are rejected for the same reasons as claims 1, and 6-9 above.

30. Regarding claims 26-34, they are the system claims of claims 1, 6-10, 19, and 21 above. Therefore, they are rejected for the same reasons as claims 1, 6-10, 19, and 21 above.

Response to Arguments

31. Applicant's arguments filed 02/20/2008 have been fully considered but they are not persuasive.

32. Applicant argues on pg 9 of Remarks:

"The reference to Wenniger teaches an active semaphore, but not one that causes execution to be resumed in response to a message it sends. To the contrary, in

Wenniger all that happens is an interrupt is initiated, apparently to indicate that the resource is no longer used by a certain entity. But Wenniger is careful to point out that his interrupt does not enable the resource to be accessed. Instead, the resource requester must again poll the resource to determine whether or not the resource requester can use the resource because it is possible that some other requester obtained the resource in the meantime. Thus, Wenniger does not teach a system that enables execution to be resumed in response to a message from the semaphore entity."

33. Examiner disagrees. In Wenniger, the purpose of the interrupt is the same as claimed by Applicant, namely the intended use of the interrupt for resuming execution of a thread of instructions. Furthermore, the preamble of the method claim uses the language "comprising" thereby leaving the claim open-ended. Therefore, Wenniger's additional step of polling the resource again to determine the resource is available does not teach away from the claimed invention, since Wenniger also results in executing the thread of instructions.

34. Applicant argues on pg 9 of Remarks:

"Since claim 1 calls for resuming execution of the thread in response to receiving a message from the semaphore, Wenniger is insufficient, even together with Kwok, to meet the claimed limitations. Wenniger must send an interrupt and then the requester must, in response, again, poll for the resource to see if the resource requester can now access the resource. The thing that went inactive in Wenniger is the request for the resource and it cannot be immediately reactivated or activated even because Wenniger

must ask for the resource once again. Thus, even if Wenniger related to controlling threads, which he does not, a thread could not be activated without still another request for the resource.”

35. Examiner disagrees. Wenniger is related to mediating between processes using an active semaphore (col 1 lines 25-28). It is old and well known in the art that process and threads are analogous. All of Applicant's independent claims use the open-ended term, “comprising”, that allows for the Wenniger reference to be used as prior art as argued by Examiner above. Since Wenniger results in a thread resuming execution, albeit with the extra polling step, Kwok and Wenniger read upon the claimed invention.

36. Applicant argues on pg 10:

“Claim 12 calls for a semaphore entity to receive the semaphore request message from the execution entity and to selectively grant control of the semaphore in response to the semaphore request message, by transmitting a semaphore acknowledge message to an execution circuitry, wherein the execution circuitry, in response to receiving the semaphore message, removes the thread of instructions from the inactive state. Nothing of the sort happens in Wenniger or, for that matter, in Kwok. Therefore, reconsideration of the rejection is respectfully requested.”

37. Examiner disagrees. As argued in claim 1, Wenniger teaches, a process can initially query the semaphore to see if it's available, i.e. semaphore request message (col 6 lines 17-22). The process may then await receipt of an interrupt indicating that

control of the resource has been relinquished (col 6 lines 14-16). The process is then allowed to actively poll the resource upon receipt of the interrupt (col 6 line 17).

38. Applicant argues on pg 10:

"Claim 22 calls for means for maintaining the first thread of instructions in the inactive state until a message is received from a semaphore entity and means for resuming execution of the first thread of instructions in response to receiving the message from the semaphore entity. Again, this does not happen in either Kwok or Wenniger. Therefore, reconsideration is requested."

39. Examiner disagrees. Wenniger clearly teaches that the processes are prohibited from actively polling the semaphore until receipt of an interrupt, i.e. directed to become inactive (col 6 lines 45-52). The process is then allowed to become active upon receipt of the interrupt (col 6 line 17).

40. Applicant argues on pg 10:

"Claim 26 calls for semaphore entity coupled with the execution circuitry to receive the semaphore request message from the execution circuitry and to selectively grant control of the semaphore in response to the semaphore request message by transmitting the semaphore acknowledge message to the execution circuitry, wherein the execution circuitry, in response to receiving a semaphore acknowledge message, removes the thread of instructions from the inactive state. This never happens in Kwok or Wenniger. Moreover, there is no execution circuitry that removes the thread of

instructions from the inactive state, much less in response to receiving an acknowledge message from a semaphore entity."

41. Examiner disagrees. As argued above, Wenniger teaches, a process can initially query the semaphore to see if it is available, i.e. semaphore request message (col 6 lines 17-22). The process may then await receipt of an interrupt indicating that control of the resource has been relinquished (col 6 lines 14-16). The process is then allowed to actively poll the resource upon receipt of the interrupt (col 6 line 17).

Conclusion

42. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric C. Wai whose telephone number is 571-270-1012. The examiner can normally be reached on Mon-Thurs, 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng - Ai An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Meng-Ai An/
Supervisory Patent Examiner, Art Unit 2195

/Eric C Wai/
Examiner, Art Unit 2195